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PhD Thesis Summary – *Résumé de thèse* *

Biology of the dolphin *Coryphaena hippurus* (Linnaeus, 1758) and its implications for the artisanal fisheries of the south Pacific of Mexico, by María del Carmen ALEJO PLATA (1).

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The dolphinfish (*Coryphaena hippurus* Linnaeus, 1758) is an oceanic epipelagic fish found worldwide in tropical and subtropical waters. It is a fast-swimming top-level predator, with a high dispersal capability via large-scale migrations and is targeted by both recreational and commercial fisheries. A significant catch is taken along the Pacific coast of Mexico by artisanal fisheries, even though the area within 80 km of the coastline is reserved by law for sport fishing. Information on life history parameters over the capture zones is useful for developing a resource management plan. The objectives of this study were to determine the reproduction biology, to estimate population parameters, and to describe the fishery of the dolphinfish caught in the South Pacific of Mexico. Results were based on 3,494 females, and 3,877 males obtained from artisanal fisheries catches during the period of December 2004 to December 2007. Dolphinfish size ranged from 20.5 to 152.0 cm fork length (FL). Age was estimated by counting growth rings in scales of 266 fish. We found significant linear relationship between FL and scale radius. An annual periodicity was identified in growth mark: marginal Increment Index indicated that a single annulus is formed yearly in April-May, which is related to the gonadosomatic index. Scales reading analysis allowed determining up to four growth rings. Similar data were obtained from length frequency analysis by kernel density estimators. Results of von Bertalanffy's growth function obtained by simple non linear regression were: $L_{\infty} = 125.82$ cm, $k = 0.9955$/year, $t_o = -0.037$ years for females, and $L_{\infty} = 126.29$ cm, $k = 1.0$/year, $t_0 = 0.0385$ years for males. From the analysis of monthly length frequency distribution of 7371 dolphinfish, the values obtained were: $L_{\infty} = 166.5$ cm, $k = 1.1$/year for females, and $L_{\infty} = 167.7$ cm, $k = 1.3$/year for males. No differences in growth were found between sexes. Estimated growth parameters were within the range of previous values reports for the dolphinfish at other latitudes and showed the rapid growth of the species. The length-weight relationship showed negative allometry in females and positive in males. Preliminary estimates of annual total mortality (Z) using the catch curve vary from 1.28 to 1.42 per year, and the alternative estimate using the Beverton-Holt method was 1.47-1.78 per year. The estimate of natural morality (M) was from 0.86 to 0.97 per year, longevity is estimated as 3.5 years. The reproductive activity was assessed using gonad histology, oocyte development, maximum whole oocyte size, maturity, and gonadosomatic index. The sex ratio (males:females) was 1:1, except in April-May (1:1.5, $P < 0.05$) and November (1:0.5, $P < 0.05$). The sex ratio at different size classes showed a significant bias towards females at smaller sizes (< 75 cm FL), whereas the males were predominant in the larger size classes (> 100 cm FL). The estimated size-at-50%-maturity for females was 48.38 ± 0.84 cm, whereas for males it was 50.57 ± 2.16 cm. The batch fecundity for female fish between 49 and 129 cm FL was 45,022-1,930,245 hydrated oocytes per female. The average interval between spawns was 2.0 days. The size distribution of oocytes, with at least two groups of oocytes in the ovaries, suggests that *C. hippurus* is a multiple spawner with an extended spawning season in the study area. The results suggest a pre-spawning migration and evidence of two main spawning events occurring in May-July and November-January. Abundance of dolphinfish generally followed variation in the concentration of chlorophyll a. Two pulses were observed, the strongest in November-January, and the other from April to May. Catch per unit effort monthly average showed significant differences in each of the examined years, with variations from 0.5 to 1.32 fish per trip. Seasonal variation in abundance of dolphinfish is related with the pre-spawning migration, which is closely related to the rain-dry regime and to the wind upwelling during the "Tehuanos" season. Therefore, we may conclude that *C. hippurus* uses intensely the coastal zone of the Gulf of Tehuantepec as an area for reproduction, with aggregation behavior during spawning. Based on the characteristics of the fishery and population parameters of the present study, we suggest two measures to be enforced for the dolphinfish in the Gulf of Tehuantepec: restrictions on the number of fishing licenses, and on the type and size of the hooks, so that the fishing effort is applied to organisms larger than 60 cm LF, which already have reached maturity and therefore have reproduced at least once.

Key words. – Coryphaenidae - *Coryphaena hippurus* - Pacific coast of Mexico - Gulf Tehuantepec - Population dynamics - Reproduction - Artisanal fishery.

* A pdf of this PhD thesis is available at: http://sfi.mnhn.fr/sfi/8.theses/8.theses.html

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